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trollers and Accounting Officers, composed principally of city officials. The discussion developed the fact that the members of the association and others interested would not have the same degree of confidence in reports prepared by state and city officials as in those compiled by a Federal agency, such as the Bureau of the Census. The contention was that city and state officials would be inclined to present the figures of their city or state in such a manner as to show the financial transactions of their respective governments in the most favorable light. Furthermore, it was thought that the several city officials could not prepare comparable reports. The Association accordingly adopted a resolution to the effect that the census reports on financial statistics of cities and states should be compiled by agents of the Bureau of the Census.

The Bureau of the Census, however, still feels that it is only reasonable that the various cities and states should bear a part of the expense of this undertaking which is costing the government about \$100,000 annually, of which approximately \$45,000 represents the cost of field work; and it is only fair to add that the city officials in 1921 very generally expressed a willingness to assist in any practicable way. Accordingly, it is proposed that in the future the Bureau send an agent to each city and state to be canvassed, with the distinct understanding that the city furnish clerical assistance to the agents of the Bureau, thereby reducing materially the expense of collecting the statistics in the field. Undoubtedly the National Association of Comptrollers and Accounting Officers can accomplish this by a persistent campaign among the officials in the different cities and states. Each state and city should designate a clerk familiar with their books to assist the representatives of the Bureau in compiling the census schedules. Upon this basis it is the intention to continue the work as recommended by the Census Advisory Committee, the National Association of Comptrollers and Accounting Officers, state and city officials, and others who are interested in public finance.

STATISTICS ON EMPLOYMENT: A REJOINDER

The idea in my footnote ¹ at which Mr. Hornell Hart apparently took offense in his reply in the September JOURNAL ² was not the result of any hasty or "careless" judgment on my part, but of long and careful consideration. I welcome the opportunity of stating more fully my objections to his method and of discussing his objections to mine—despite the unprofessional tone which he has chosen to use.

Giving attention to the four so-called "eccentricities" which Mr. Hart begins by pointing out:

(a) The first must, I think, be ignored, as Mr. Hart does not specify the incorrect footnote reference nor any of the misquotations, which of course I should have been glad to correct if proved.

(b) Mr. Hart's next objection is obscure. My point was that the typical behavior of the metal industry in reflecting the general industry cycle is even more

¹ This JOURNAL, Mar., 1922, p. 42, note 5.

² Pages 385-391.

strikingly demonstrated by employment than by production data. The coefficients in question were respectively 90 and 85 per cent. My statement as quoted by Mr. Hart is both correct and clear, so far as I can see.¹

(c) Mr. Hart seems greatly to overrate the importance of always stating the probable error of correlation coefficients, because, whether the number of items be large or small, the probable error itself has a probable error, and moreover the very statement of a so-called probable error leads many persons to overlook the errors in the original data, which may be equally or more important. It is no oversight, as Mr. Hart implies, but a deliberate opinion on the part of many other writers as well as myself that the use of probable errors is very much over-emphasized in time series of economic data.

(d) Mr. Hart is in error in expecting to find the mean of every cycle series 0.0 and its standard deviation 1.0. Indeed in many instances there would be ground for alarm if this were the case! The secular trend of a series is determined by the data embracing as nearly as possible some whole number of cycles. Once constructed, this trend may be extrapolated for short periods at either end of the base period for series which, like the ones under discussion, disclose little or no change of trend. This is a common and legitimate device, employed by Professor Persons and other leading students of time series for studying an index during parts of cycles adjacent to the original period. Therefore it ought not to seem disconcerting but perfectly natural to Mr. Hart that frequently $a \neq 0$ and $\sigma \neq 1$. Naturally, in computing correlation coefficients allowance is made for this fact by using the correction formula.

In appraising the numbered points to which Mr. Hart next proceeds, several considerations should be borne in mind:

Mr. Hart states in his discussion of point 2 that "correlation with business indexes cannot be considered an adequate criterion for judging the value of unemployment indexes"; and yet under point 1 he used such correlation of employment indexes with prices (65 vs. 52 per cent) as a condition sufficient "to remove any basis for supposing that Mr. Berridge's index deserves to be substituted," etc. These are clearly irreconcilable ideas.

In particular, price is an especially poor criterion for testing any index of employment because of the differences in their economic nature—one is predominantly physical while the other is not.² Professor Persons and Miss Coyle would be the last to claim that their ten-commodity index of prices measures *actual* industrial activity; prices are only an indirect measure. On economic grounds production is clearly much better suited as a test of the validity of employment indexes, though even here a higher correlation certainly does not of *itself* prove greater validity. Thus the employment index based on data for three states, which I showed in the June issue of this JOURNAL,³ is more highly correlated

¹ The reader may judge for himself by referring to the original context, *Rev. of Economic Statis.*, prel. vol. 4, Jan., 1922, pp. 23, 24, including footnote 24. Compare Edmund E. Day, "An Index of the Physical Volume of Production," *Rev. of Economic Statis.*, prel. vol. 2, Dec., 1920, p. 367. As for the term "per cent," I see no essential difference between it and "hundredths," if this is Mr. Hart's point.

² For further discussion see *Rev. of Economic Statis.*, prel. vol. 4, pp. 24, 38-9.

³ Page 236, Chart 4.

with pig iron production than is the New York index (89 *vs.* 85 per cent), but this fact is not enough to prove the superiority of the former without carefully considering the *a priori* grounds for accepting its components. For these reasons Mr. Hart's correlations of employment with prices are wholly inconclusive.

I cannot accept Mr. Hart's third argument, in favor of including all kinds of unemployment in the final index. It seems to me a cardinal tenet that unemployment due to depression, season, sickness, labor disputes, etc., forms not one problem but a series of very different problems, which should be studied separately as far as possible. True, I have not published any paper dealing with these types; but I have by no means "discarded" them. A final re-combination of all these factors is not only unnecessary but undesirable.

Practically all of Mr. Hart's fourth criticism seems to me beside the point, because it presupposes that I have been trying to measure the volume of unemployment, or at least the absolute numbers unemployed—an aim which I have disavowed repeatedly and emphatically. On the other hand, my purpose has been to develop as accurately as I could a picture of the *fluctuations* by using the index method.

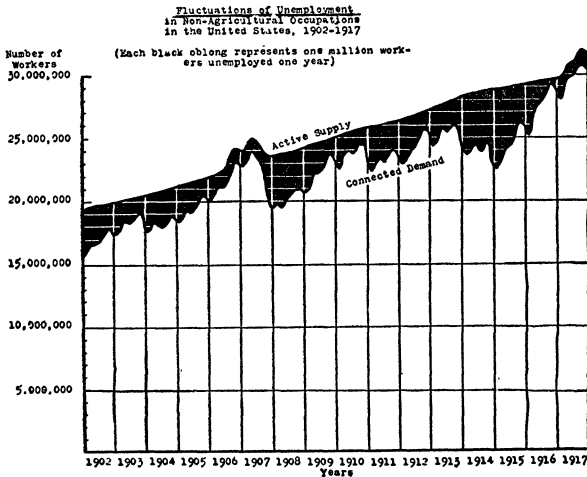
Under point 5, I agree that the samples which I have used in my index are not extremely large, though the three states comprise more than one fourth of the industrial activity of the entire country; but I deny that they are "biased."¹ I sought, for use in the index, only those data which seemed sure or at least likely to merit such treatment. Mr. Hart, on the other hand, accepted numerous data which I regard as untrustworthy for my purpose, and even more so for his; and other materials which are so fragmentary as to be safely used only as supporting evidence he has grafted directly into his measurements. Without rigorous selection of data it is impossible to obtain reliable results. As in my original reference to Mr. Hart's monograph, I concede its outward "comprehensiveness," and maintain that he paid dearly for this by accepting unsuitable materials. Comprehensiveness won on such terms is but an empty virtue.

Another important source of error, in addition to the uncritical selection of data, lies in the way Mr. Hart has attempted to use his data. One advantage of adopting the index method is that we thereby avoid the measurement of aggregates. Mr. Hart, however, has sought to measure (a) the aggregate volume of connected demand for labor, (b) the aggregate supply, and by subtracting the first from the second, (c) the aggregate volume of unemployment (see accompanying chart). In measuring connected demand, for instance, he attempted to translate data drawn from twenty-one distinct sources² into estimates of the absolute number of persons employed in each month from 1902 to 1917. A still further and perhaps even greater source of error lies in his determination of urban labor supply. This is based on annual estimates of population, birth and death rates, migration, etc., modified in an abrupt and somewhat arbitrary manner in 1906-7 and 1917 (see chart). I would go even further than Mr. Hart in pointing out variables that would have to be measured in order to obtain a base

¹ Mr. Hart greatly exaggerates the differences among industries as to the normal timing of employment cycles. For evidence on the similarity among localities see this JOURNAL for June, page 232.

² Enumerated on p. 49 of his monograph, from which the chart is also taken.

line suitable for the purpose he has in mind; indeed they are so numerous, and so imperfectly represented in available statistics, that I regard the problem as virtually an indeterminate one. If the secular trend is, as Mr. Hart claims, a "crude and unsatisfactory" datum for measuring the fluctuations of an employment index, then his supply line is still more "crude and unsatisfactory."



Finally, the method of obtaining a residuum by subtracting one of these large and unreliable absolutes from the other magnifies the seriousness of the errors in them both; this seems self-evident.

In view of all these considerations, I am unable to convince myself that my own methods or results have been affected at any vital point by Mr. Hart's attack, or that I should change my original verdict on his research.

W. A. BERRIDGE

A PROPOSAL FOR A STANDARD SERIES OF STATISTICAL REFERENCE BOOKS

For many years there has been a feeling among trained and experienced statisticians that standards of professional skill should be established in the statistical field comparable in a general way with those which are recognized in many other professions. Attempts have been made at various times to formulate such standards, but these attempts have resulted in little more than an increased realization of the difficulty of outlining professional requirements in a scientific field as broad and complex as that of statistics.

During the early part of the present year this question was brought up for consideration at a meeting of the Board of Directors of the Statistical Association. After considerable discussion it was agreed that the real need at present was not